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REMARKS:

The Applicants have carefully reviewed the Examiner's comments in the Office Action and have prepared the following response.

Claims 10, 11, 13, 15-16, and 20-21 have been amended.

Claims 1, 3-13, and 15-22 remain pending in the application.

More specifically, Applicants have amended claims 11, 13, 15, and 16 responsive to the Examiner's 35 USC §112, second paragraph rejection. Applicants have also recast dependent claims 10 and 20 into independent form as they originally depended from rejected claims but were not themselves rejected in view of prior art.

The Examiner rejected claims 11-22 under 35 USC §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention. More specifically, the Examiner indicated that it was unclear in claims 11, 13, 15, and 16 as to which conically shaped catalyst is implied. Responsive to the Examiner's rejections, Applicants have amended these claims to clarify which catalyst is implied. For example, claim 11 has been amended to recite, "...wherein each of the plurality of angled surfaces is disposed downstream of a respective one of said plurality of conically shaped catalysts...". Applicants believe claims 11-22 are now definite within the meaning of 35 USC §112, second paragraph.

The Examiner rejected claims 1, 3-9, 11-13, 15-17 and 19 under 103(a) as being unpatentable under various combinations of the following references: Shioya (5,144,800); Maus (5,103,641); Gottberg (5,996,339); Gary (5,103,641) and GB 1,455,351. Applicants respectfully traverse this argument for the reasons set forth below.

Applicants agree with the Examiner's comments that the "comprising" language opens the instant claims to the inclusion of an exhaust manifold. However, the Examiner's point seems misplaced in that claims 1, 3-13, and 15-22 expressly require the conically shaped catalyst(s) to be contiguous to the exhaust ports of the engine. Contiguous is defined in Webster's Encyclopedic Unabridged Dictionary as "1. touching, in contact; and 2. in very close proximity without actually touching". The catalysts 11, 12 shown in Shioya's Figure 1 are nowhere near the exhaust ports of the engine, let alone contiguous. More specifically, catalyst 12 is disposed adjacent to the lower half of the engine cylinder

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block and under the exhaust manifold; not anywhere near the exhaust ports of the cylinder head. Furthermore, catalyst 11 is disposed under the bottom of the engine adjacent to the oil pan, separated from the exhaust ports of the cylinder head (in terms of the contiguous definition) by the exhaust manifold, the cylinder block, and the oil pan.

Therefore, Applicants assert that notwithstanding the use of the transitional term "comprising", the prior art cited by the Examiner fails to teach the claim limitation of catalyst(s) disposed contiguous to the exhaust port(s) as required by independent claims 1, 11 and 21 and thus these claims as well as their respective dependent claims are allowable.

Applicants understand claims 21-22 to be allowable after amending independent claim 21 responsive to the Examiner's 35 USC 112, second paragraph rejection. Since claims 21 and 22 were not rejected for any other reason Applicants believe these claims are now in condition for allowance. Likewise, Applicants note that since claims 10 and 20 were not rejected in view of prior art, claims 10 and 20 are therefore now allowable as amended in their independent form to overcome the Examiner's 35 USC §112 rejection.

In view of the foregoing amendments and remarks, Applicants submit that the claims are patentable over the prior art and the application is in a condition for allowance. Applicants respectfully request reconsideration and an early notice of allowance. If a telephone conference would expedite allowance or resolve any further questions, such a conference with the undersigned is invited at the convenience of the Examiner.

Respectfully submitted,



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ATTACHMENT

SPECIFICATION AMENDMENTS:

The rear face 310 of the conical catalyst is disposed within an open chamber 312 within the shell 106. The chamber 312 promotes mixing and thermal equilibrium. The exhaust gas flow from the rear face 310 is directed towards the main catalyst brick 220. The main catalyst brick is, preferably, generally cylindrical in shape and having an angled front face 314. The brick is surrounding on its exterior surfaces by a conventional mat 315 that is disposed between the brick 220 and the shell 106. Front face 314 is angled such that the front face 314 is closer to the rearward-most catalyst [212] 214 than it is to the forward-most catalyst [208] 210. It should be appreciated that the angled front face 314 and the portion of the shell that is adjacent to the tubes 108 form an angle referred to as 'A' in Figure 3. In this embodiment, the angle chosen is 18 degrees, this amount provides benefits both in catalyst packaging and exhaust gas mixing. The main catalyst brick 220 is preferably constructed from a ceramic substrate having a constant cell size. It should be appreciated that the cells are oriented in the direction of flow indicated by arrow 320 and that the cells maintain a constant cross sectional area throughout the brick. Cross sectional area is defined perpendicular to the longitudinal flow path. Towards the downstream portion of the main catalyst brick 220 a conical portion 322 is formed. The conical portion 322 has a middle section 324 that extends downstream further than the side sections 326. The side sections 326 are angled inward at a greater degree than the degree by which the exit portion 112 of the shell 106 is angled inward, thereby providing an area 327 that increases in the downstream direction. It should be appreciated that the middle section 324 has an exit surface 328 that is perpendicular to the exhaust gas flow of the system and is slightly smaller in diameter 332 than the exit pipe 116 whose diameter is referenced by numeral 330.

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CLAIM AMENDMENTS:

10. (AMENDED) [The catalyst system set forth in claim 9] A catalyst system for a motor vehicle having an engine with an exhaust port that carries exhaust gases away from the combustion chamber of the engine, wherein the exhaust gases leave the combustion chamber and flow in a downstream direction by first entering the exhaust port, said catalyst system comprising:

a shell with at least one conduit extending therefrom and including a downstream end and an exit portion having a diameter formed on the downstream end, the exit portion decreases in diameter in the downstream direction;

a conically shaped catalyst disposed contiguous to the exhaust port of the engine and including cells having a cross sectional area, the cross sectional of at least one of the cells of said conically shaped catalyst increases in the downstream direction; and

a main brick catalyst having an angled front face disposed downstream of said conically shaped catalyst, wherein said main brick catalyst includes a downstream end having a conically shaped formation having a diameter, said diameter of said conically shaped formation decreases in the downstream direction at a rate greater than the rate at which said exit portion of said shell decreases in diameter in the downstream direction, wherein the shell encloses the main brick catalyst and the at least one conduit houses the conically shaped catalyst and the at least one conduit is attached to the engine and circumscribes the exhaust port when attached, and wherein said conically shaped catalyst includes a rear face disposed at an acute angle from said angled front face of said main brick catalyst.

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11. (TWICE AMENDED) A catalyst system for a motor vehicle having an engine with a plurality of exhaust ports that carry exhaust gases away from the combustion chamber of the engine, wherein the exhaust gases leave the combustion chamber and flow in a downstream direction by first entering the exhaust ports, said catalyst system comprising:
- a shell with a plurality of conduits extending therefrom;
 - a plurality of conically shaped catalysts disposed contiguous to the exhaust ports of the engine; and
 - a main brick catalyst having a front face that includes a plurality of angled surfaces, wherein each of the plurality of angled surfaces is disposed downstream of a respective one of said plurality of conically shaped catalysts, wherein the shell houses the main brick catalyst and the plurality of conduits house the plurality of conically shaped catalysts and the plurality of conduits are attached to the engine and circumscribe the exhaust ports when attached.
13. (TWICE AMENDED) The catalyst system as set forth in claim 12, wherein each of said plurality of conically shaped catalysts include a rear face that is substantially parallel to a respective one of said plurality of angled surfaces of said main brick catalyst.
15. (TWICE AMENDED) The catalyst system as set forth in claim 11, wherein each of said plurality of conically shaped catalysts include cells having a cross sectional area, said cross sectional area of at least one of said cells of said plurality of conically shaped catalysts increases in the downstream direction.
16. (TWICE AMENDED) The catalyst system as set forth in claim 15, wherein each of said plurality of conically shaped catalysts include a metallic substrate.

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20. (AMENDED) [The catalyst system of claim 19,] A catalyst system for a motor vehicle having an engine with a plurality of exhaust ports that carry exhaust gases away from the combustion chamber of the engine, wherein the exhaust gases leave the combustion chamber and flow in a downstream direction by first entering the exhaust ports, said catalyst system comprising:
- a shell with a plurality of conduits extending therefrom and including a downstream end and an exit portion having a diameter formed on the downstream end, the exit portion decreasing in diameter in the downstream direction;
- a plurality of conically shaped catalysts disposed contiguous to the exhaust ports of the engine; and
- a main brick catalyst having a front face that includes a plurality of angled surfaces, wherein each of the plurality of angled surfaces is disposed downstream of a respective one of said plurality of conically shaped catalysts, wherein said main brick catalyst includes a downstream end having a conically shaped formation having a diameter, said diameter of said conically shaped formation decreases in the downstream direction at a rate greater than the rate at which said exit portion of said shell decreases in diameter in the downstream direction, and wherein the shell houses the main brick catalyst and the plurality of conduits house the plurality of conically shaped catalysts and the plurality of conduits are attached to the engine and circumscribe the exhaust ports when attached.

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21. (TWICE AMENDED) A catalyst system for a motor vehicle having an engine with a plurality of exhaust ports that carry exhaust gases from the combustion chamber of the engine, wherein the exhaust gases leave the combustion chamber and flow in a downstream direction by first entering the exhaust ports, said catalyst system comprising:

a plurality of conically shaped catalysts disposed contiguous to the plurality of exhaust ports of the engine, said plurality of conically shaped catalysts have a front face and a rear face, said rear face being larger than said front face, each of said plurality of conically shaped catalysts also include a metal substrate and a plurality of cells that vary in size, said cell size increasing in the downstream direction;

a shell that includes a plurality of tubes extending therefrom, each of said plurality of tubes receive a respective one of said plurality of conically shaped catalysts, said shell includes an exit portion that decreases in diameter in the downstream direction and said plurality of tubes are attached to the engine and circumscribe the exhaust ports;

a main brick catalyst disposed within said shell, said main brick catalyst is substantially cylindrical in shape and disposed downstream from said plurality of conically shaped catalysts, said main brick includes an angled front face and a downstream end, said downstream end has a conically shaped formation that decreases in diameter in the downstream direction at a rate greater than the rate at which said exit portion of said shell decreases in the downstream direction, said main catalyst brick includes a ceramic substrate; and

an exhaust pipe attached to said exit portion of said shell.